

Application for:

Revised Locally Adopted Energy Standards by the City of Culver City
Building Safety Division

Establishing a mandatory 1kw solar photovoltaic system (or as an alternate an equivalent solar water heating system) for new commercial construction of 10,000 s.f. or greater and new multifamily construction of 10,000 s.f. or greater in Accordance with Section 10-106 of the California Code of Regulations, Title 24, Part 1

April _____, 2007

From:
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Executive Summary

The City of Culver City Building Safety Division has researched and reviewed the feasibility and cost effectiveness of building permit applicants exceeding the performance requirements of the 2005 Energy Efficiency Standards.

The current and projected staffing level of the Culver City Building Safety Division will not support an additional energy efficiency program which requires a large amount of additional plan check staff time or additional field inspection staff time. The existing Building Safety Division staff will be able to implement and manage this proposed solar photovoltaic initiative.

Having established local energy efficiency criteria contained in the language of draft Resolution #____ (included as attachment #1 to this document). The City would like to implement its resolution at the earliest convenient date following approval by the California Energy Commission.

As stated in the resolution application, the proposed local energy efficiency standards and implementation have been designed with several key criteria in mind. These include:

- Consistency with the structure, format, and calculation methods of the 2005 Title 24 Energy Efficiency Standards;
- Simplicity and clarity for Building Safety Division enforcement for both energy plan review and field inspection;
- Meeting the local energy compliance requirements as defined by the resolution which exceed the 2005 Title 24 standards; and;
- The provision of flexibility by allowing construction permit applicants to meet the new requirement by one or more design approaches: (a) a solar photovoltaic system; and/ or (b) a solar hot water heating system; and/ or (c) paying an equivalent amount into a City fund to pay for solar systems on City owned facilities or other local non-profit entities.

This application to the California Energy Commission conforms to the requirements laid out in Section 10-106 of the California Code of Regulations, Title 24, Part 1, *LOCALLY ADOPTED ENERGY STANDARDS*. The proposed Culver City resolution shall take effect only after the Commission has reviewed and formally approved the proposed local energy standards as meeting all requirements of Section 10-106.

Statement per Section 10-106(b)3. The proposed resolution requires that all new commercial and multifamily residential construction shall be designed to consume no more TDV energy than permitted by Title 24, Part 6.

The main features of the proposed resolution are that:

1. New commercial or multifamily construction shall be required to install 1kw of solar photovoltaic power per each new 10,000 square feet of construction, or fraction thereof.
2. If the geometry of the new project doesn't permit compliance with the requirement, the construction permit applicant may pay an equivalent amount into a City fund to pay for solar systems on City facilities or other local non-profit entities.
3. This requirement will reduce the demand for offsite electricity for new commercial and multifamily buildings in Culver City.
4. It is expected that builders will consider enlarging the photovoltaic systems beyond the 1kW requirement,

With respect to any technical questions concerning the development, methodology, descriptions, or implementation outlined in this application, please contact Craig Johnson at Culver City Building Safety.

Estimated solar photovoltaic energy result of the Proposed Resolution

The resolution proposes a mandatory 1kw solar photovoltaic system per 10,000 square feet of new commercial or multifamily construction; with an equivalent solar water heating system as an acceptable alternate, or if the geometry of the proposed project won't permit compliance with the resolution the permit applicant may pay an equivalent amount into a City fund to pay for solar systems on City facilities or other local non-profit entities.

It is expected that complying with the resolution will allow participating buildings to exceed the 2005 California Energy Efficiency Standards.

Note: the resolution makes it clear that all new buildings must comply with the California Title 24 Energy Standards in effect at the time of permit application. The resolution is in addition to the California Title 24 Energy Standards.

Participating buildings wishing to determine the energy value of photovoltaic installations in comparison to the total energy use calculated by using a California Energy Commission approved compliance program may follow the methodology provided below to convert kW installed PV to Time Dependant Valuation in kTDV/sf-yr.

$$1151 \text{ kWh} \times 3.414 \text{ Btu/Wh} \times 4.98 \times .88 = 17,186 \text{ kTDV/yr}$$

1151 kWh/year – assumed generation per year for a 1 kW system

3.414 Btu/W: = conversion from watts to British thermal units

4.98 = the average annual average TDV energy multiplier during daylight hours for Culver City.

0.88 = multiplier per the New Solar Homes PV Calculation for dirt and a modest percentage of non-working PV collectors

The value is then divided by the conditioned floor area of the building to calculate the kTDV/sf-yr.

For example; a 1 kw PV system on a new 10,000 sf commercial or multifamily building in Culver City:

$$\frac{17,186 \text{ TDV kBtu/yr}}{10,000 \text{ s.f.}} = 1.72 \text{ kTDV/sf-yr}$$

Simple Time Dependant Cost Benefit Analysis

	Estim. cost of constr.	Estim. cost of 1 kw PV system	Estimated CEC rebate	Estim. Fed. tax credit	Final 1 kw system cost	Final System cost as a percentage of constr. cost	Estim. annual dollar value of energy produced	Estim. simple payback time
10,000 s.f. commercial building	\$1,500,000 (\$150/ s.f.)	\$11,000	\$3,176 (\$2.50/ watt)	\$1,564	\$6,260	.4% (.0041)	\$380 (\$3/ kWh)	<u>16 1/2 years</u>
10,000 s.f. multifamily building	\$1,700,00 (\$170/ s.f.)	\$11,000	\$3,176 (\$2.50/ watt)	\$1,564	\$6,260	.3% (.0036)	\$380 (\$3 kWh)	<u>16 1/2 years</u>

Estimated cost of each 1 kw PV system if financed as part of the overall Building

Estimated 30 year finance costs as of April 2007 of \$1,000: \$4.50 per month or \$54 per year.

A final 1 kw solar PV cost of \$6,260 finance cost would be \$28 per month or \$336 per year.

A final 1 kw solar PV cost of \$6,260 would produce an energy value of \$31 per month or \$380 per year.

Financing as part of the overall building a 1 kw solar PV system may result in a positive cash flow of approximately \$3 per month or \$34 per year.

Estimated Carbon Emissions Reduction of a 1 kW solar PV system

Each 1 kw solar PV system is reasonably expected to generate 1,151 kWh annually.

Based on a carbon dioxide emission factor of 818 pounds per Mwh a 1 kW PV system would save approximately 940 lbs of carbon dioxide emissions per year.

Implementation Plan

The proposed Culver City solar initiative would only apply to the larger commercial and multifamily residential construction projects in Culver City. Culver City is approximately 98% built out. There are approximately 2,400 construction permits, including plumbing, electrical, and mechanical permits, issued in a typical year in Culver City. The vast majority of them are for small residential or commercial remodel and/ or addition projects.

The proposed Culver City solar initiative would apply to approximately 6 - 12 projects per year, obviously varying each year.

All medium to large proposed Culver city development projects are required to complete a City Planning Division discretionary review prior to any construction permit applications.

If the solar initiative is put into effect each project applying for a discretionary review would receive an informational handout; describing the program and listing further sources of information, system installers, etc.

All qualifying projects applying for construction permits will again be informed of the requirement at the time of permit application.

All projects the solar initiative applies to that apply for construction permits would be required to supply the standard energy forms and information on the plans indicating compliance with the 2005 California Energy Efficiency Standards. There will be no changes to the energy forms or the field inspection of qualifying projects, other than the plan review and field inspections of the required solar PV systems.

Culver City Building Safety staff have attended a training seminar on field inspecting solar PV systems, given by Mr. Bill Brooks of Brooks Engineering.

Required solar PV systems will be field inspected concurrently with the overall building construction. The overall building construction will not receive a final inspection nor will it receive a certificate of occupancy until all building systems, including the solar PV systems, are completed and operating.

January 2007

Culver City proposed mandatory 1 kw solar photovoltaic system per 10,000 s.f. of new commercial or multifamily construction

Cost/ benefit analysis of a 1kw solar photovoltaic system installed on a 10,000 s.f.

COSTS

Estimated installed cost of a 1kw solar photovoltaic grid intertie system (not including any rebates):

\$12,000.00

Estimated Operation and Maintenance Costs over 30 years

\$4700.00

Total Costs over life of System

\$16,700.00

SAVINGS

Energy Savings Over 30 Year Life Expectancy

\$24900.00

Federal Tax Credit

\$2700.00

Federal Depreciation

\$40.00

State Depreciation

\$200.00

Income Tax on Electricity Savings

\$(10100.00)

Income Tax on Rebates

\$(200.00)

Total Savings over life of System

\$17500.00

Payback
years

29

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